

FY 17 Research Program IMPACT Report

20 Year Plan Next Level Roads - Economic Competitiveness & Quality of Life - Great Service - 21st Century Workforce



On-Time, On-Budget – Take Care of What We Have – Customer Satisfaction



Challenges to Research Program

■ Next Level Roads

- 5 Year impact
- 122 lane miles
- 9,628 lane miles resurfaced
- 1,295 bridges for rehabilitation or reconstruction

■ Total projects

- FY 2018: 670 projects
- FY 2019 to 2022: 700 to 900 projects each FY

■ Challenges

- More specialized Testing requests
- More pavement investigation requests
- More focus research projects to resolve issues in the field
- More new innovations to be studied and implemented in the field





FY2017

RESEARCH PROGRAM IMPACT REPORT



Report Outline

■ IMPACT Areas

1. *Operational Excellence*
2. *Professional Development*
3. *Engagement and Networking*
4. *State and National Recognition*
5. *Forensic Investigation and Specialized Testing Programs*
6. *Legislation, Innovations, and Economic Development*
7. *Program Goals and Metrics*



Report Outline



Operational Excellence



Professional Development



Engagement and Networking



State and National Recognition



Forensic Investigation and Specialized Testing Programs



Legislation, Innovations, and Economic Development



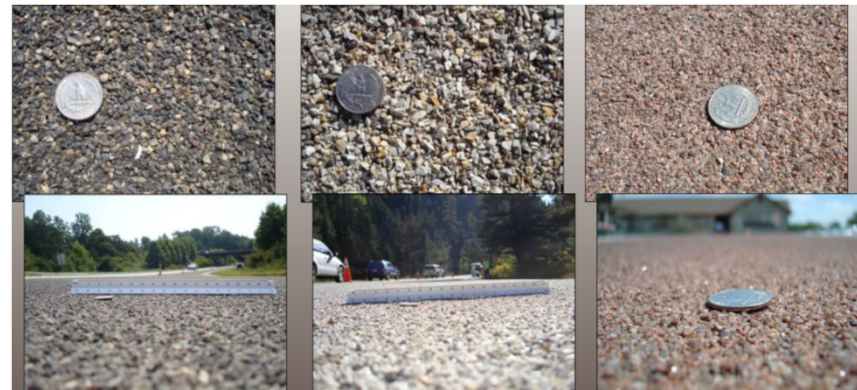
Program Goals and Metrics



IMPACT on Mobility and Safety

■ High Friction Surface Treatment Selection (SPR-3832)

- *Improve friction on horizontal curves, interstate ramps, and bridges*
- *Reduce weather related accidents*
- *Curves: 28% of all highway fatalities*



■ Site Selection for New Lighting Technologies (SPR-3833)

- *>30% energy savings*
- *20% reduction in crashes due to lighting issues*
- *Low maintenance*



Operational Excellence

High Impact Research



IMPACT on Mobility and Safety

■ Centerline/Edge Line rumble strips

- Reduce accidents on rural two lane roads
- Reduced noise level with innovative sinusoidal profile

■ Performance of Alternative Diamond Interchanges (SPR-3866)

- Innovative interchange design
- Higher traffic capacity, decreased delays
- Reduced construction costs
- Reduced crashes



Operational Excellence

High Impact Research



IMPACT on System Preservation

- **Development of a Cost Effective Bridge Preservation and Rehabilitation Program (SPR-3320)**

- *Better selection of preservation treatments (crack sealing & deck sealing)*
- *Increase in deck service life*

- **Precast Slab Pilot Implementation (SPR-3947)**

- *Faster construction technique to open to traffic*
- *Increased mobility, reduced travel time*
- *Reduced User Costs*
- *Longer lasting pavement patching*



Operational Excellence

High Impact Research



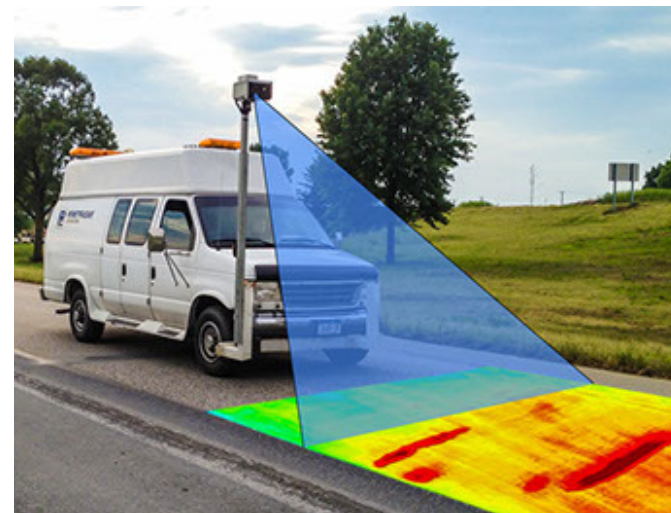
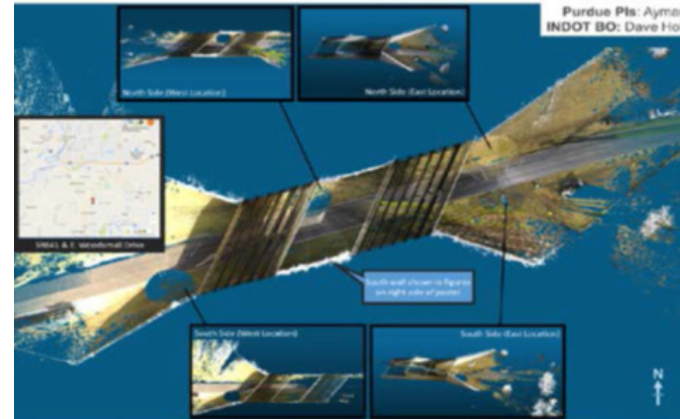
IMPACT on System Preservation

- **LiDAR Applications for Safety & Asset Management**

- Innovative technology
- Work Zone safety, MOT compliance
- MSE wall performance

- **NDT testing of bridge decks, SHRP 2 Implementation funding for network level assessment**

- Innovative technology – nondestructive evaluation
- Early detection/prevention
- High ROI
- Better data – better, cost effective rehabilitation strategies
- Better selection of bridge candidates for preservation and rehabilitation



Operational Excellence

High Impact Research



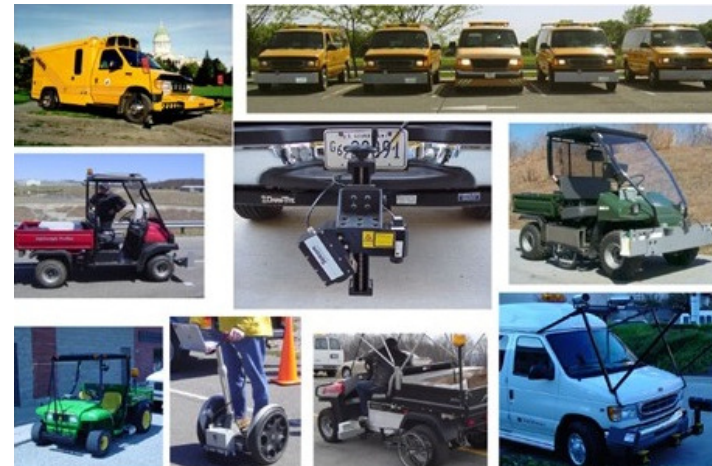
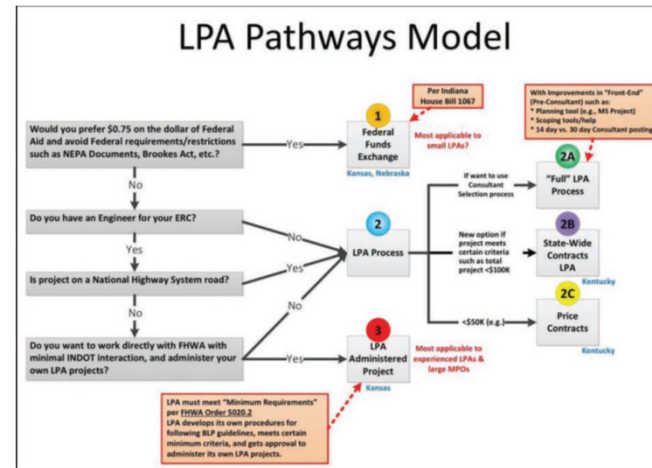
IMPACT on Process Improvements

■ LPA Process Improvement (SPR-3823)

- Streamlining of local contract processes
- Local ownership and accountability

■ Smoothness Specifications Implementation

- Fair and balance bidding process
- Objective, more accurate measurements
- Longer lasting pavement
- Replaces profilograph with inertial profilometer



Operational Excellence

High Impact Research



IMPACT on Process Improvements

- **Virtual Construction Inspection Technology (SPR-3945), best practices for:**

- *Pavement*
- *Bridges*
- *MSE Walls*
- *Soil and Geotechnical Investigations*
- *Innovative technology*



Operational Excellence

High Impact Research



IMPACT on Strategic Goals

- **S-BRITE, Bridge Inspector - training/certification**
 - *Better bridge inspection procedures and capabilities*
 - *Better trained bridge inspectors*
 - *Talent Management & human resource development*
- **Unmanned Aircraft System (UAS) Flight Demonstration on 01/21/2017**
 - *New technology applications*
 - *Easier and Safer to reach sites for inspection and monitoring*
 - *Global view of the whole structures/projects*
 - *Potential in accident investigations*



Operational Excellence

High Impact Research



IMPACT on Strategic Goals

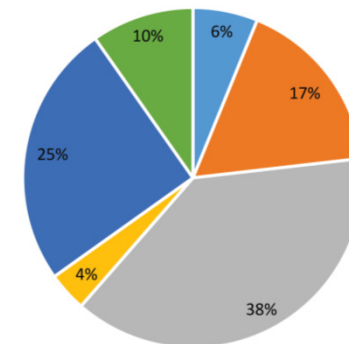
■ Improving Energy Efficiency of Facilities

- Facility energy audits and monitoring using EnergyStar
- Reduced energy costs
- Uniform energy design practices

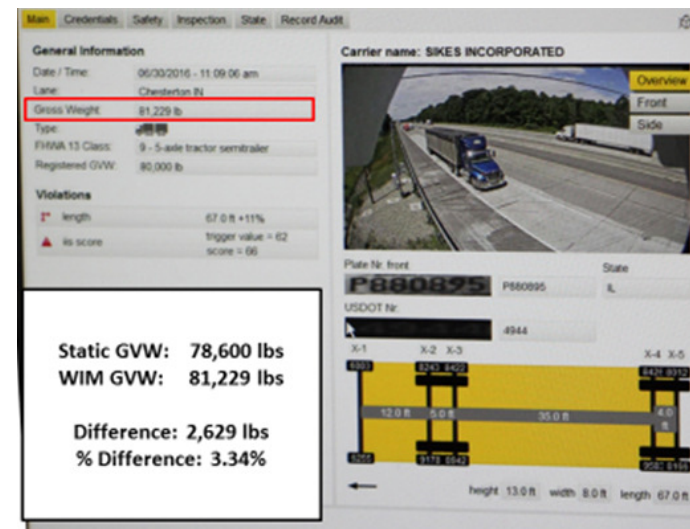
■ Weigh-In-Motion: feasibility study

- New WIM technology
- Validated WIM system for compliance & accuracy
- Gov. Office request
- INDOT looking at existing WIM and potential retrofits

Energy Costs



- Greensburg Unit
- Indianapolis Materials and Test
- Research Division (West Lafayette)
- Crawfordsville District Admin
- Falls City Subdistrict
- Frankfort Sub and Unit



Operational Excellence

High Impact Research



IMPACT on Legislative, Planning and Finance Policies

- **Cost Allocation, Vehicle Mile Travelled and Revenue Generation Studies**
 - *Legislative impact*
 - *Found truck classes 5 to 13 underpaying*
 - *Found truck classes 1 to 4 overpaying*
 - *Impacted HB1002 & Cambridge Systematics study*
- **Economic Development Impact of Corridor Improvements and Preservation Projects (SPR-3912)**
 - *Additional \$150,000 from SHRP 2 Implementation funding.*
 - *Model goes beyond typical economic analysis*



Operational Excellence

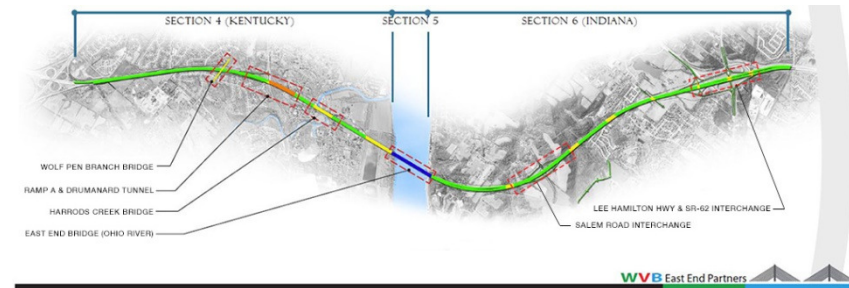
High Impact Research



IMPACT on Legislative, Planning and Finance Policies

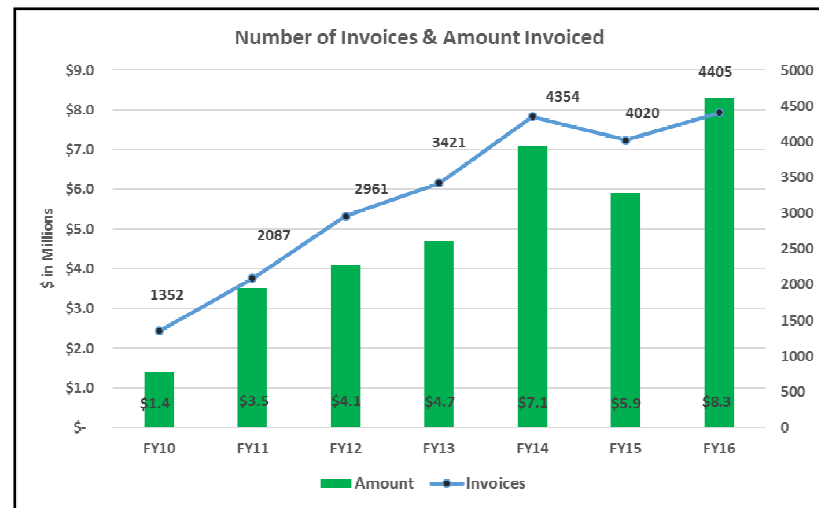
- **Ohio River Bridge, East End Crossing Project AAR of Procurement Models (SPR-4200)**

- Captures Best Practices for P3



- **Damage-Wise**

- Increasing revenue by better documentation
- Record number of Invoices and amount invoiced
- FY17, \$10M in receipts



Operational Excellence

High Impact Research



IMPACTs on Funding and Partnership – EDC and STIC

- **Attracted External Funding & Partnerships**
 - \$200,000 State Transportation Innovation Council (STIC)
 - \$635,000 SHRP Implementation Assistance
- **Coordinated 22 projects on EDC 3 and EDC 4**
 - Ready to Implement technologies
 - Additional funding/leveraging opportunities



U.S. Department of Transportation
Federal Highway Administration

AASHTO



Operational Excellence

Everyday Counts



IMPACT: EDC-3 Innovations (1/1/2015 – 12/31/2016)

Impacting INDOT Innovation and Staff Development

- Section 1304 (reduced match for innovation) - **Karen Hicks**
- 3D Engineered Models – **Mike Jenkins**
- Data-driven safety analysis – **Mike Holowaty (also Brad Steckler & John Wright)**
- eConstruction – **Mike Jenkins and Mark Miller**
- GRS-IBS – **Patrick Conner** with LTAP
- Improving collaboration and environmental documentation – **Laura Hilden**
- Improving DOT Railroad coordination – **Doug Gannaway**
- LPA stakeholder partnering – **Kathy Eaton-McKalip**
- Road diets – **Roy Nunnally, (and Laura Slusher with LTAP)**
- Smart work zones – **Ed Cox and Darcy Bullock**
- Ultra-high performance concrete connections – **Jeremy Hunter and Anne Rearick**



IMPACT: EDC- 4 Innovations (1/1/2017 – 12/31/2018)

Innovations, Market-ready Technologies, Partnering, Leveraging

- *Automated Traffic Signal Performance Measures (ATSPMs)*
- *Accelerating Traffic Incident Management (TIM) Data Collection*
- *Advanced Hydraulic Modeling Tools*
- *Community Connections*
- *Data-Driven Safety Analysis (DDSA)*
- *e-Construction and Partnering: A Vision for the Future*
- *Integrating NEPA and Permitting*
- *Pavement Preservation (When, Where, and How)*
- *Road Weather Management – Weather-Savvy Roads*
- *Safe Transportation for Every Pedestrian (STEP)*
- *Ultra-High Performance Concrete Connections for PBES*



IMPACTed by SHRP 2 Implementation Assistance Funding

Fourth Round Products June 2014	Proof of Concept Pilot	Lead Adopter Incentive	User Incentive
R09: Managing Risk in Rapid Renewal Projects			8 \$ 30,000
R10: Innovative Strategies for Managing Complex Projects			8 \$ 30,000
R06C: Rapid Technologies to Enhance Quality Control on Asphalt Pavements	2 (GPR) \$ 50,000	5 – 10 (IR) \$ 60,000	
R06E: Real-time Smoothness Measurements on PCC		5 – 10 \$ 60,000	
C03/C11: T-PICS/Economic Analysis Tools		6 \$125,000	12 \$25,000
R06A: Nondestructive Testing Technologies for Concrete Bridge Decks		Up to 8 \$ 100,000	



IMPACTed by SHRP 2 Implementation Assistance Funding

Sixth Round Products, June 2015	Proof of Concept Pilot	Lead Adopter Incentive	User Incentive
Utility Investigation Technologies, (R01B)	Up to 5 \$150,000		
Precast Concrete Pavement, (R05)		Up to 4 \$300,000	Up to 5 \$75,000
Identifying and Managing Utility Conflicts, (R15B)		Up to 5 \$100,000	
New Composite Pavement Solutions, (R21)		Up to 3 \$160,000 to \$500,000	
WISE: Work Zone Impacts and Strategies Estimator Software, (R11)	Up to 4 \$250,000		
Plan Works; Better planning, Better projects, (C01)		Up to 7 \$300,000	



IMPACTed by SHRP 2 Implementation Assistance Funding

7 th Round Products, June 2016	Proof of Concept Pilot	Lead Adopter Incentive	User Incentive
Utility Investigation Technology Bundle (R01A/R01B/R15B)		Up to 15 \$150,000	
Reliability in Simulation and Planning Models (L04)	Up to 2 \$ 200,000		
Reliability Data & Analysis Tools (L02/L05/L07/L08/C11)		Up to 10 \$100,000	
Plan Works: Better planning. Better projects. (C01)			Up to 8 \$100,000
Regional Operations Forum (L36)		Up to 8 \$100,000	
Railroad-DOT Mitigation Strategies (R16)		Up to 8 \$75,000	Up to 12 \$25,000
Nondestructive Testing for Tunnel Linings (R06G)			Up to 8 \$30,000

IMPACTed INDOT Talent Management and Evolve Program

■ EVOLVE field trips

- ORB Construction Project Field Visit
- Subaru of Indiana
- Port of Indiana
- INDOT staff, ES, faculty, students (future INDOT employees)

■ ***Inside INDOT article:*** *"Young Professionals Experience Huge Learning Moments"*



Professional Development



IMPACTed Pavement and MSE Walls Training

■ Pavement Training

- Complete training curriculum on pavement in 8 weeks
- Better analysis and decision making for INDOT program managers and engineers
- First round, 2012 to 2014, 26 participants
- Second round, 2016 to present, 28 participants
- Result: better, cost-effective pavement designs, longer service life for Indiana pavements



■ MSE Walls Training

- Better inspection procedure for inspectors
- Better trained inspectors
- Avoid costly mistakes
- IMPACTs performance, failed materials and litigation
- First round in 6 Districts, 475 participants
- Second round, TBA



Professional Development



Engagement IMPACTs: INDOT Staff Visit and TRB Visit

- **JTRP Chairman & INDOT Executive Staff Visit R&D Facility and Purdue Campus**
 - Focus: Engagement
 - November 1, 2016
- **TRB State Visits**
 - 2015, Focus: Pavement and Materials
 - 2016, Focus: Construction and Planning
 - 2017, Focus: Bridges and Structures



Engagement & Networking



Engagement IMPACTs: New Transformational Technologies

- **Connected and Autonomous Vehicles Workshop**
 - Date: June 15, 2017
- **Transportation Active Safety Institute (TASI) at IUPUI**
 - Date: August 17, 2017
- **Potential new partnering, cost sharing opportunities**



Engagement & Networking



National Recognition IMPACTs: AASHTO Sweet 16 Awards and TRB Papers

- **AASHTO Sweet 16 Award**
 - *SPR-3833, Site Selection for New Lighting Technologies*
- **AASHTO Subject Area Award**
 - *SPR-3831, Safety Data Acquisition and Management*
- **INDOT Traffic Signal Innovation**
 - **TRB best paper award**
 - *Highlighted in Inside INDOT*
- **Aggregate Durability Testing**
 - *Shorter freeze and thaw testing time from 2 weeks to a few hours*
 - *Cost savings*



State and National Awards



IMACTing INDOT Forensic Investigations

- **Bridges under fire**
 - *Investigate the integrity of concrete bridge after fire*
 - *Possible damage wise claims*
- **MSE Walls investigations, 25 + 11 sites**
 - *Potential litigation case*
 - *Better construction procedures*
- **Pavement premature failure on SR-26**
 - *Potential latent defect cases*
 - *Better understanding of best practices in asphalt overlay*



Forensic Investigation



IMPACTs from Specialized Testing Programs

- **Falling Weight Deflectometer**
 - Pavement scoping
 - Pavement design
 - Pavement investigation
- **3D Laser Pavement Condition**
 - Precise crack width, length, depth
 - Super-elevation on slopes
 - Longitudinal and transverse profile
 - Smoothness and texture
- **Friction Testing**
 - To assure safety for the traveling public
 - Approval of aggregate materials
- **Network Level GPR Evaluation of 47 Bridge Decks**
 - Better scoping and bridge candidates selections
 - Data driven decision for preservation and rehabilitations



Forensic Investigation



IMPACTed by INDOT Peer Groups

- **February 15 Show Case & Peer Group meetings to identify research needs and on an ongoing basis**
 - *124 needs submitted thus far for FY 2018*
- **FY 2017 INDOT Research Program**
 - *77 Research Needs submitted,*
 - *49 Research Projects initiated,*
 - *24 Completed Studies,*
 - *79 Active Studies*



Peer Groups, Focus Groups

Research Program



IMPACT on Customer Satisfaction

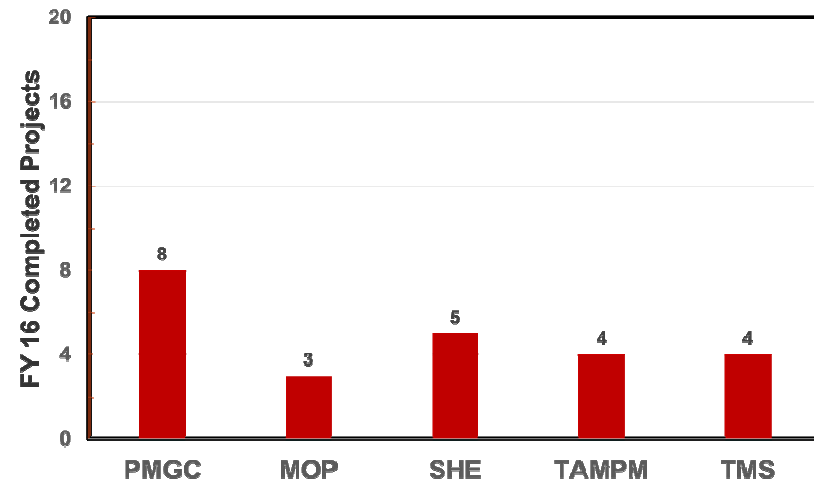
■ Research Projects

- 91% of INDOT 32 Business Owners indicated a response of very good or better (Qualtrics survey)
- Research Program IMPACTs all areas of INDOT

■ Specialized Testing & Forensic Investigations

- 100% of respondents indicated meets expectations or better
- Litigation cases settled in INDOT's favor!

■ Satisfied Customers!



positive
IMPACT



Peer Groups, Focus Groups

Customer Satisfaction



IMPACT Challenges going forward

- *Additional networking opportunities between INDOT, practioners and academia*
- *Developing a research and continuous improvement culture in INDOT Peer Groups*
- *Better awareness and engagement of all interested faculty*
- *Managing time extensions*
- *Follow through on Implementation Plans*
- *More needs than money*
- *Others*





ABOVE & BEYOND

WHEN A TEAM OF DEDICATED INDIVIDUALS MAKES A COMMITMENT
TO ACT AS ONE...THE SKY'S THE LIMIT.